

## **REMARKS**

### A. Background

Claims 12, 13, 15, 16, 18, 20-23 and 28-42 were pending in the application at the time of the Office Action. Claims 12, 13, 15, 16, 18, 20-23 and 28-42 were rejected as being anticipated by and/or obvious over cited art. By this response applicant has cancelled claims 28, 33, 34, and 40-42; and amended claims 12, 29, and 35. As such, claims 12, 13, 15, 16, 18, 20-23, 29-32, and 35-39 are presented for the Examiner's consideration in light of the following remarks.

### B. Examiner Interview

Applicant would like to thank the Examiner for the courtesy of the telephone interview conducted on March 28, 2008. The article titled "Inherently Mode-Hop-Free Distributed Bragg Reflector (DBR) Laser Array" by Fujiwara et al. ("*Fujiwara*") was discussed and contrasted with the invention as defined by independent claim 12. Specifically, the scope of the length of DBR regions disclosed by *Fujiwara* was discussed in light of the actual DBR lasers used in *Fujiwara* and the graph shown in Figure 3. Applicant's representative explained that the lasers used in *Fujiwara* only disclose DBR lengths of 200  $\mu\text{m}$  and greater, which corresponds to only a portion of the graph shown in Figure 3. Applicant's representative further explained Applicant's position that Figure 3 simply shows a general relationship between the actual length and the effective length for all lengths of DBR regions, not that all of the DBR lengths were or would be used in *Fujiwara*. The Examiner stated that he was not persuaded and that he maintained that the graph signified that all lengths of DBR were disclosed in *Fujiwara*, even though the specific examples given in *Fujiwara* only disclosed DBR lengths of 200  $\mu\text{m}$  and greater.

C. Proposed Amendments

Applicant has herein amended claims 12, 29, and 35 to further clarify, more clearly define, and/or broaden the claimed inventions to expedite receiving a notice of allowance. Specifically, claims 12, 29, and 35 have been respectively amended to include the limitations recited in claims 28, 34, and 40, which previously depended from claims 12, 29, and 35. Claims 12, 29, and 35 have also been amended to recite “wherein according to an increase or decrease in the DBR control current, a refractive index of said active region optical waveguide equally decreases or increases, respectively, in accordance with a refractive index of the first DBR region and the second DBR region” (in claims 12 and 29), or simply “the DBR region” (in claim 35). The amendments to the claims are supported in the application at least at paragraph [0041] and cancelled claims 28, 34, and 40. In view of the foregoing discussion, applicant submits that the amendments to the claims do not introduce new matter and entry thereof is respectfully requested.

D. Indefiniteness Rejection

Paragraphs 3 and 4 of the Office Action reject claims 41 and 42 under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Inasmuch as claims 41 and 42 have been cancelled herein, the indefiniteness rejection of those claims has been rendered moot.

E. Anticipation Rejection

Paragraphs 5 and 6 of the Office Action reject claims 12-13, 18, 21, 23, 28-32, 34-38 and 40-42 under 35 USC § 102(b) as being anticipated by *Fujiwara*. Inasmuch as claims 28, 34, and

40-42 have been cancelled herein, the indefiniteness rejection of those claims has been rendered moot. Of the remaining rejected claims, claims 12, 29, and 35 are independent claims. Applicant respectfully traverses this rejection and submits that *Fujiwara* does not anticipate claims 12-13, 18, 21, 23, 29-32, and 35-38 because *Fujiwara* does not include each and every claim limitation recited in the rejected claims.

*Fujiwara* discloses using DBR lasers to demonstrate mode-hop-free tuning characteristics. To do so, *Fujiwara* used two types of DBR lasers: a mode-hop-free DBR laser (designated as “Type A”) and a conventional DBR laser (designated as “Type B”). As shown in Figure 1, the mode-hop-free laser included an active layer with two passive layers on either side thereof. *Fujiwara* discloses that a single tuning current can be used to control the wavelengths of both DBR regions. See p. 1132, second column. Experiments were conducted and the differences between the two types of lasers contrasted. Applicant notes that besides the effect the tuning current has on the wavelength, discussed above, *Fujiwara* fails to disclose any information regarding any currents, including the effect of any current on the refractive index of the active layer.

In light of the above, Applicant submits that *Fujiwara* does not disclose or suggest “wherein according to an increase or decrease in the DBR control current, a refractive index of said active region optical waveguide equally decreases or increases, respectively, in accordance with a refractive index of the first DBR region and the second DBR region such that a ratio of the lasing wavelength shift quantity to the Bragg wavelength shift quantity is maintained in a range from 0.9 to 1.1,” as recited in amended claims 12 and 29, or “wherein according to an increase or decrease in the DBR control current, a refractive index of said active region optical waveguide equally decreases or increases, respectively, in accordance with a refractive index of

the DBR region such that a ratio of the lasing wavelength shift quantity to the Bragg wavelength shift quantity is maintained in a range from 0.9 to 1.1,” as recited in amended claim 35. Accordingly, Applicant respectfully requests that the anticipation rejection with respect to claims 12, 29, and 35 be withdrawn.

Claims 13, 18, 21, 23, 30-32, and 36-38 depend from claims 12, 29, and 35 and thus incorporate the limitations thereof. As such, applicant submits that claims 13, 18, 21, 23, 30-32, and 36-38 are distinguished over the cited art for at least the same reasons as discussed above with regard to claims 12, 29, and 35. Accordingly, Applicant respectfully requests that the anticipation rejection with respect to claims 13, 18, 21, 23, 30-32, and 36-38 also be withdrawn.

Applicant further submits that it would not be obvious to modify the *Fujiwara* lasers to include the added limitations because the claimed DBR laser is based on a totally new theory of operation than conventional DBR lasers. In conventional DBR lasers, such as in *Fujiwara*, an increase in the active region current hardly affects the initial phase conditions because the carrier density is clamped. Accordingly, the conventional DBR laser operates on the premise that the carrier density is constant and refractive index is not changing in the active region. Applicant notes that this is discussed in paragraph [0021] of the present application.

In contrast, the DBR laser of the presently claimed inventions is designed such that according to an increase or decrease in the DBR control current, a refractive index of the active region optical waveguide equally decreases or increases, respectively, in accordance with a refractive index of the DBR region. See, e.g., claim 1. Because the theory of operation regarding the refractive index of the active region is fundamentally different, Applicant submits that it would not be obvious to modify *Fujiwara* to incorporate the added limitations.

F. Obviousness Rejection

Paragraphs 7 and 8 of the Office Action reject claims 16 and 20 under 35 USC § 103(a) as being obvious over *Fujiwara* in view of U.S. Patent No. 4,905,253 to Chraplyvy et al. (“*Chraplyvy*”).<sup>1</sup> *Chraplyvy* was merely cited for allegedly teaching “an anti-reflection coatings to two end faces.” Paragraph 9 of the Office Action rejects claims 22, 33, and 39 under 35 USC § 103(a) as being obvious over *Fujiwara* in view of U.S. Patent No. 4,993,036 to Ikeda et al. (“*Ikeda*”). *Ikeda* was merely cited for allegedly teaching a “diffraction grating with different grating.” Inasmuch as claim 33 has been cancelled herein, the rejection of that claim has been rendered moot. Regarding the remaining rejected claims, Applicant submits that the Office Action has not established that the allegedly obvious combinations would include each and every element recited in the rejected claims.

Claims 16, 20, 22, and 39 each depend from one of claims 12 and 35 and thus incorporate the limitations thereof. As such, even if, *arguendo*, it would have been obvious to combine *Fujiwara* with the cited references in the allegedly obvious manners set forth in the Office Action, the resulting combinations would still not cure the deficiencies of *Fujiwara* with regard to claims 12 and 35. As such, Applicant submits that claims 16, 20, 22, and 39 are distinguished over the cited art for at least the same reasons as discussed above with regard to claims 12 and 35. Accordingly, Applicant respectfully requests that the obviousness rejections with regard to claims 16, 20, 22, and 39 be withdrawn.

No other objections or rejections were set forth in the Office Action.

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<sup>1</sup> The Office Action mistakenly asserts that claim 24 is also rejected. However, as the Office Action confirms on the Summary page, claim 24 is not currently pending.

D. Conclusion

Applicant notes that this response does not discuss every reason why the claims of the present application are distinguished over the cited art. Most notably, applicant submits that many if not all of the dependent claims are independently distinguishable over the cited art. Applicant has merely submitted those arguments which it considers sufficient to clearly distinguish the claims over the cited art.

In view of the foregoing, applicant respectfully requests the Examiner's reconsideration and allowance of claims 12, 13, 15, 16, 18, 20-23, 29-32, and 35-39 as amended and presented herein.

In the event there remains any impediment to allowance of the claims which could be clarified in a telephonic interview, the Examiner is respectfully requested to initiate such an interview with the undersigned.

Dated this 2<sup>nd</sup> day of April 2008.

Respectfully submitted,

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